

## DATA EVALUATION RECORD

[Primary Reviewer's Name]

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**STUDY TYPE:** PRODUCT PERFORMANCE [No guideline No.]  
**MRID:** 483474-01; McCoy, T.C., Silica Dust Formulation  
Efficacy for Control of Bed Bugs (*Cimex lectularius*),  
September 10, 2010.

**DP BARCODE:** 387010  
**DECISION NO:** 444104  
**SUBMISSION NO:** 888576

**SPONSOR:** Rockwell Labs Ltd., 1512 Taney St., North Kansas City,  
MO, 64116

**TESTING FACILITY:** Department of Entomology, Virginia Tech, Blacksburg,  
VA, 24061

**STUDY DIRECTOR:** Dini M. Miller, Ph.D.

**SUBMITTER:** Cisse Spragins, Ph.D., Rockwell Labs Ltd., 1512 Taney  
St., North Kansas City, MO, 64116

**STUDY COMPLETED:** 10/09/2010

**CONFIDENTIALITY  
CLAIMS:** None

**GOOD LABORATORY  
PRACTICE:** Not conducted according to GLP 40 CFR Part 160 EPA  
(FIFRA)

**TEST MATERIAL:** PRODUCT NAME: SiliCide™  
EPA REGISTRATION NUMBER OR FILE SYMBOL:  
73079-RE  
ACTIVE INGREDIENT NAME: Amorphous Silica Gel  
CHEMICAL NAME: Silicon dioxide  
A.I. %: 100  
PC CODE: 072605  
CAS NO.: 7631-86-9  
FORMULATION TYPE: Dust  
PRODUCT APPLICATION RATES g/m<sup>2</sup>: 2 oz/100 ft<sup>2</sup>  
(6.1 g/m<sup>2</sup>, reviewer calculated); 1 lb/1000 ft<sup>2</sup> (4.9 g/m<sup>2</sup>,  
reviewer calculated)

ACTIVE INGREDIENT APPLICATION RATE(S)g/m<sup>2</sup>:  
same as product

**PROPOSED LABEL**  
**MARKETING CLAIMS:** Bed Bugs

**EPA REQUESTS:**  
[EPA WILL ADD DIRECTIVES HERE]

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## STUDY REVIEW

**Study Number/Title:** (if more than one study is provided in the MRID)

**Purpose:** To test the efficacy of silica dust against bed bug adults, nymphs, and eggs.

## **MATERIALS AND METHODS**

**Test Location:** Dodson Urban Pest Management Laboratory at Virginia Tech University, Blacksburg, VA.

**Test Material(s):** The test material was amorphous silica gel applied at the label rate of 2 oz/100 ft<sup>2</sup> and 2 oz/1000 ft<sup>2</sup> (The 2 oz/ 1000 ft<sup>2</sup> rate was not listed on the label and may be a typographical error.) The reviewer does not know if the material is the same as the EPA product or file symbol.

**Test Species Name, Life Stage, Sex and Age:** Adult, nymphs (3-5<sup>th</sup> instars), and eggs of Epicenter strain bed bugs (*Cimex lectularius*).

**Describe test containers, chambers and/or apparatus (include site description and location) and how experiment was conducted:**

Petri dishes (9.5 cm dia.) containing either adult or nymphs were inverted onto hardwood panels which had been pre dusted with the test material (2 oz/100 ft<sup>2</sup>). The eggs were deposited on filter paper discs (4.25 cm dia.) and then dusted with silica dust at 2 oz/1000 ft<sup>2</sup> (This application rate is not mentioned on the label, but this value may actually be 1 lb/1000 ft<sup>2</sup> which is on the label). The adults and nymphs were evaluated for mortality at 1, 2, 4, 5, 6, 8, 10, 12, and 15 hours following continuous exposure. After the eggs were dusted by brush with silica dust, observations of hatching and mortality after hatching were observed for 8 days.

**List the treatments including untreated control (express application rate as g/m<sup>2</sup>):** For tests on adults and nymphs, the text on page 5 indicates that control tests were conducted but the results were not given. Control results were given in a figure for hatching of untreated eggs. The application rate was 6.1 g/m<sup>2</sup> for adults and nymphs and 0.6 g/m<sup>2</sup> for eggs if this indeed was the actual exposure (see above paragraph).

**Number of replicates per treatment:** four

**Number of individuals per replicate:** 10 adults and 10 nymphs; groups of bed bug eggs

**Length of exposure to treatment (time in seconds, minutes or hours):** Continuous exposure for 15 hours in tests with adults and nymphs and 8 days of continuous for eggs and nymphs that hatched.

**Experimental conditions (state relative humidity, temperature, and photoperiod):** Not given for test environments, but while being reared for testing, rearing jars kept at 27°C, 55 % RH, and 12:12 photoperiod.

**State data or endpoints that were to be collected/recorded:** Mortality for adults and nymphs and hatchability for eggs followed by mortality for nymphs that hatched.

**Were the data analyzed? If so, what statistical analyses were performed?**

Yes, the adult and nymphal assays were analyzed using a Probit analysis. The egg data were described based on % hatch and % mortality. The untreated control in the egg assay had 0% mortality. As mentioned earlier, no comparisons with control test were presented for Petri dish testing of adults and nymphs although the text in the study report says that control tests were performed.

**RESULTS**

Tables 1 and 2 show the  $LT_{50}$  and  $LT_{90}$  values respectively for adult and nymphs. For adults, 100 % mortality was achieved by 15 hours and for nymphs, by 10 hours. Treatment did not have any effect on egg hatchability (at day 8, 97 % hatched compared to control value of 99 %), but did cause 68 % mortality by day 4 and 100 % by day 8 of the nymphs that hatched. Raw data were presented with the exception of the control data for the Petri dish experiments preventing the use of Abbott's formula. However the control data presented with the egg test does show the expected results.

**Table 1. Comparison of  $LT_{50}$  values calculated for pyrethroid resistant bed bugs (Epic center strain) confined on hardboard panels dusted with silica dust (9.5 cm dia treatment area) at the rate of 2oz/100 sq. ft. (n = 4 replicates).**

<b>Treatment</b>	<b>N</b>	<b><math>LT_{50}</math> (hours)</b>	<b>95% CIs</b>	<b>Slope <math>\pm</math> SE</b>
Adults	40	9.3a	8.6 – 10.2	0.32 $\pm$ 0.3
Nymphs	40	4.3b	3.8 – 4.8	0.43 $\pm$ 0.05

Values followed by the same letter are not significantly different at  $p=0.05$

**Table 2. Comparison of  $LT_{90}$  values calculated for pyrethroid resistant bed bugs (Epic center strain) confined on hardboard panels dusted with silica dust (9.5 cm dia treatment area) at the rate of 2oz/100 sq. ft. (n = 4 replicates).**

<b>Treatment</b>	<b>N</b>	<b><math>LT_{90}</math> (hours)</b>	<b>95% CIs</b>	<b>Slope <math>\pm</math> SE</b>
Adults	40	13.3a	12.2 – 15.1	0.32 $\pm$ 0.3
Nymphs	40	7.3b	6.6 – 8.2	0.43 $\pm$ 0.05

Values followed by the same letter are not significantly different at  $p=0.05$

### **Study Authors Conclusions**

No conclusions were presented, but the data support the submitter's addition of bed bugs to the label.

### **Reviewers Conclusions**

Control mortality data were not available for the Petri dish experiments, but the mortality from the egg hatchability study was 0%..

### **Reviewer Recommendations**

The study is acceptable, but (1) the untreated control data should have been provided for the Petri dish experiments and (2) clarification should be provided regarding the label application rates versus the test application rates. The rate of 2 oz/1000 ft<sup>2</sup> used in the egg hatchability test is not mentioned on the label and could be a typographical error. Also, the label should provide more details when and on what pests the different application rates apply.